

REMARKS

Claims 1-9 are pending in the application. These claims were rejected as follows:

Claims / Section	35 U.S.C. Sec.	References / Notes
1, 2 & 6	Objection	<ul style="list-style-type: none">• Use of "configured to" language
1-9	§112, Second Paragraph Indefiniteness	<ul style="list-style-type: none">• Antecedent basis
7	§102(b) Anticipation	<ul style="list-style-type: none">• Graumann (German Patent Document No. DE 100 03 524 A1).
1-6, 8 & 9	§103(a) Obviousness	<ul style="list-style-type: none">• Graumann (German Patent Document No. DE 100 03 524 A1); and• Graumann (U.S. Patent No. 6,139,183).

5 Applicants have amended claims 1, 2, 6 and 7 and have also provided discussion for distinguishing the present invention, with claims as amended, from the art cited against it.

Applicants' use of reference characters below is for illustrative purposes only and is not intended to be limiting in nature unless explicitly indicated.

10 **OBJECTION TO CLAIMS 1, 2 AND 6**

1. Applicants have amended claims 1, 2 and 6 to remove the language objected to by the Examiner.

In the OA, on pp. 2-3, the Examiner objected to language elements containing "configured to", "being configured" and "configured for" as not
15 constituting a positive limitation to the claims. Therefore, the language objected to has been eliminated by the present amendment. Applicant notes that

functional language in apparatus claims is expressly permitted by the patent statute.

Based on the amendments, Applicants respectfully request that the objections to the claims be withdrawn.

5 **35 U.S.C. §112, SECOND PARAGRAPH, INDEFINITENESS OF CLAIMS 1-9**

2. *Applicants have amended claim 1 to provide proper antecedent basis for language relating to the "isocenter".*

In the OA, on p. 2, the Examiner rejected claim 1 as not having proper antecedent basis for the term "the isocenter". Therefore, Applicants have
10 amended claim 1 so that "a common isocenter" is referenced.

3. *The central beam and the isocenter are not fixed with respect to each other since the isocenter simply defines a common point of intersection of the central x-ray beam for all different orientations.*

In the OA, on p. 2, under numbered paragraph 3, the Examiner stated that
15 claim 1 is indefinite because the central beam and the isocenter are fixed with respect to each other and thus the central beam cannot be moved back to the isocenter.

Applicants respectfully disagree. In the Specification, in paragraph [0005], the isocenter is simply defined as a point in space at which the central x-ray
20 beam passes for all different orientations. For an isocentric C-arm, this is ensured by the simple mechanical structure of the C-arm itself. However, for non-isocentric C-arms, as the arm is oriented in different directions, there is no single point through which the central x-ray beam passes when the C-arm is

oriented in a different direction, absent additional x and y movement. The present invention corrects the linear position of the C-arm based on its orientation to ensure that as the C-arm is placed in different orientations, the central x-ray beam always passes through a common point—the isocenter. The central x-ray beam is linear and thus it can be assured that for any orientation of the C-arm, an appropriate linear correction can be made to ensure that the central x-ray beam passes through a common point. Thus, the central beam and the isocenter are not fixed with respect to each other and the central beam can be moved back into the isocenter.

For these reasons, Applicants respectfully request that the Examiner withdraw the 35 U.S.C. §112 rejection from the present application.

35 U.S.C. §102(b), AND §103(A) CLAIM 7 ANTICIPATION BY GRAUMANN '524 AND CLAIMS 1-6, 8 AND 9 OBVIOUSNESS OVER GRAUMANN '524 AND GRUAMANN '183

4. The prior art fails to anticipate or obviate the present invention

because both references disclose isocentric C-arms and not non-isocentric C-arms.

In the OA, on pp. 3-5, the Examiner indicates that the two Graumann references anticipate or obviate the elements of the independent claims in the application. With respect to Graumann '524, the Examiner states on p. 3:

With respect to claim 7, Graumann ('524) teaches a method for operating a 3-D C-arm x-ray device, comprising: providing a non-isocentric C-arm on the x-ray device; positioning an x-ray source for producing an x-ray beam in close proximity to an isocenter within the C-arm; and orbitally rotating the C-arm during an examination of the x-ray source and adjusting a vertical adjustment device of the C-arm (column 2, lines 33-50 and column 4, lines 1-4).

With respect to the Graumann '183 reference, the Examiner states, on p.

4:

5 Graumann ('524) is silent about a horizontal
adjustment device horizontally adjusting the C-arm.
Graumann ('183) teaches a C-arm x-ray device
comprising: a vertical adjustment device (4) vertically
adjusting the C-arm and a horizontal adjustment
10 device to horizontally adjust a C-arm (8) that enables
an adjustment of the C-arm within a plane of the C-
arm (column 4, lines 13-20). This arrangement can
adjust a central x-ray beam (ZC) of the x-ray source
relative to a subject (p) for registering successive 2D
15 projections of the subject from different projection
direction used for 3D image reconstruction (column 1,
lines 5-11 and column 2, lines 42-65). It would have
been obvious to one of ordinary skill in the art at the
time the invention was made to employ the C-arm's
horizontal and vertical adjustment teaching of
20 Graumann ('183) in the x-ray device of Graumann
('524) to provide an automatically adjustable non-
isocentric C-arm x-ray device that would allow one to
register successive 2D projections of the subject from
the additional projection directions used for
25 reconstructing enhanced 3D images of the subject.

Applicants respectfully disagree with the characterization of Graumann
'524 as teaching a non-isocentric C-arm.

Referring to the figure of Graumann '524, it can be seen that the center of
the x-ray source and receiver occupy the zenith and nadir of the C-arm. This
30 permits the central beam to pass through a common isocenter (indicated by the
intersection of the dotted lines in the figure) for any orientation of the C-arm,
thereby making the disclosed C-arm isocentric. Graumann '183 similarly shows
such an arrangement (x-ray source and receiver occupying the zenith and nadir
of the C-arm).

As can be seen from Figure 1 of the present invention, the x-ray source and receiver do not occupy the zenith and nadir of the C-arm respectively, but rather are offset along the arm. Paragraphs [0007] and [0008] of the present application indicate the differences between the isocentric and the non-isocentric
5 C-arms. This results in the central beam being offset from the rotation center 6 as would be the isocenter of the isocentric C-arm of the Graumann references to an adjacent point indicated at 5 in Figure 1.


One would not turn to art that teaches the use of an isocentric C-arm as illustrated by the Graumann references for solving problems associated with the
10 use of non-isocentric C-arms as disclosed by the present invention.

For these reasons, the independent claims of the present invention are not anticipated by the Graumann '524 reference, nor obviated by the combination of Graumann references. Applicants respectfully request that the 35 U.S.C. §§102 and 103 rejections be withdrawn from the application.

CONCLUSION

Inasmuch as each of the objections have been overcome by the amendments, and all of the Examiner's suggestions and requirements have been satisfied, it is respectfully requested that the present application be reconsidered, the rejections be withdrawn and that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

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